Test procedure for Voltage Lead Monitoring Board (BNL# 23049132)

Estimated setup time – Two hours
Estimated board test time – 15 minutes per board

Required training:
Departmental high pot training.

Required equipment:
1 Hi-pot tester capable of generating 0 to 200 Volts at 1mA
2 9097U-S09-X, 1-Wire RS232 host adapter by Aagelectronica or equivalents
3 One 40-48VAC/200mA power supply
4 One 5 VDC/500mA regulated power supply
5 Twisted pair of one meter red and black jumper wires
6 PC with one RS232 port
   a PC software – 32-bit Server software from OneSix
   b Java environment form Sun Microsystems
   c Dallas 1-button test programs
7 Voltage source capable of generating -1.280 to +1.280 volts; such as Dial-A-Volt
8 Digital voltmeter
9 Label maker, prefer unit that has USB port connection such as Brother PT-2600/2610

Manual inspection
Inspect the board carefully and thoroughly for correct rating fuses, properly orientated placement of polarized capacitors.

Test Procedure
I Hi-pot test
   1. Differential Mode Hi-pot test
      a. Connect the Hi-pot tester's positive lead to "CH1+" terminal on the board and connect the negative lead to "CH1-" terminal.
      b. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.
      c. Connect the Hi-pot tester's positive lead to "CH2+" terminal on the board and connect the negative lead to "CH2-" terminal.
      d. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.
      e. Connect the Hi-pot tester's positive lead to "CH3+" terminal on the board and connect the negative lead to "CH3-" terminal.
      f. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.
      g. Connect the Hi-pot tester's positive lead to "CH4+" terminal on the board and connect the negative lead to "CH4-" terminal.

h. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.

2. Common Mode Hi-pot test
   a. Connect the Hi-pot tester's positive lead to "CH1+" terminal on the board and connect the negative lead to "J5-3 COM" terminal.
   b. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.
   c. Connect the Hi-pot tester's positive lead to "CH1-" terminal on the board and connect the negative lead to "J5-3 COM" terminal.
   d. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.
   e. Connect the Hi-pot tester's positive lead to "CH2+" terminal on the board and connect the negative lead to "J5-3 COM" terminal.
   f. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.
   g. Connect the Hi-pot tester's positive lead to "CH2-" terminal on the board and connect the negative lead to "J5-3 COM" terminal.
   h. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.
   i. Connect the Hi-pot tester's positive lead to "CH3+" terminal on the board and connect the negative lead to "J5-3 COM" terminal.
   j. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.
   k. Connect the Hi-pot tester's positive lead to "CH3-" terminal on the board and connect the negative lead to "J5-3 COM" terminal.
   l. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.
   m. Connect the Hi-pot tester's positive lead to "CH4+" terminal on the board and connect the negative lead to "J5-3 COM" terminal.
   n. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.
   o. Connect the Hi-pot tester's positive lead to "CH4-" terminal on the board and connect the negative lead to "J5-3 COM" terminal.
   p. Turn on the hi-pot tester, raise the voltage from 0 to 200 volts, confirm that the current is less than 0.7 mA. Hold for 10 seconds, and then reduce the voltage to zero and turn off the hi-pot tester.

II Alignment for Bias

1. Connect the 48VAC power supply leads to board terminals J8-1 and J8-2.
2. Remove all connections between CH1+, CH1-, CH2+, CH2-, CH3+, CH3-, CH4+, and CH4-.
3. Connect the DVM positive lead to TP1 and negative lead to TP5. Adjust R4 until the DVM reads between 1.2800 to 1.2804 volts.
4. Connect the DVM positive lead to TP2 and negative lead to TP6. Adjust R10 until the DVM reads between 1.2800 to 1.2804 volts.
5. Connect the DVM positive lead to TP3 and negative lead to TP7. Adjust R24 until the DVM reads between 1.2800 to 1.2804 volts.
6. Connect the DVM positive lead to TP4 and negative lead to TP8. Adjust R16 until the DVM reads between 1.2800 to 1.2804 volts.

III Functional Test

1. Hardware connection
   a. Connect the YELLOW wire to J5-+5VDC terminal, GREEN wire to J5-DATA terminal and the RED wire to the J5-COM terminal. The BLACK wire is not used.
   b. Turn on the power to the 48VAC power supply.
2. Load software
   a. Start the iBviewer32 program.
   b. Left click the “Click here for Viewer” button.
   c. Select 1 second as Sampling Rate.
   d. Check display for Channel A, Channel B, Channel C and Channel D.
   e. Confirm all four channels are displaying 1.2800V. Otherwise, recheck all software and hardware.
3. Input range test
   a. Connect the dial-a-volt to CH1.
      (1) Set the dial-a-volt to 0.000V, Channel A should display 1.2800V (+/-0.0010V).
      (2) Set the dial-a-volt to -1.20V, Channel A should display +0.09V to +0.12V.
      (3) Set the dial-a-volt to +1.20V, Channel A should display +2.48V to +2.50V.
   b. Connect the dial-a-volt to CH2.
      (1) Perform the range test as for CH1.
   c. Connect the dial-a-volt to CH3.
      (1) Perform the range test as for CH1.
   d. Connect the dial-a-volt to CH4.
      (1) Perform the range test as for CH1.
4. Serial number labeling
   a. From the File menu, select “Copy Log to Clipboard”, then open the Windows notepad and paste the copied data. Highlight and copy the serial number from the notepad, and then paste it onto the sitewide name file. Also paste this serial number onto the label maker. If a manual label maker is used, then type in the 16 alphanumeric characters on the label machine. Pay attentions to 1(number 1) vs l(letter L) and 0(number 0) vs o(letter o) etc.
   b. Copy the site-wide name from the database and paste to the label maker. If a manual label maker is used, then the site-wide name must be manually type in.

Conformal coating of the board
If the Voltage Lead Monitoring Board had reworked, then the reworked areas must be recoated with HumiSeal type 1B73. If the board was never coated before, then coat the board using the following procedure.

Voltage Monitoring Board Coating Procedure

1. Using compressed air blow away any dust that has accumulated on the board.
2. Spray Envi-Ro-Tech Defluxer 1676 or equivalents at a 45-degree angle to the board from all directions to cover the entire surface.
3. Allow the board to dry. (If drying is taking too long, clean compressed air could be used to accelerate the drying process.)
4. Mask all terminal blocks and the Grounding pad that will not be receiving the conformal coat.
5. Spray HumiSeal type 1B73 at a 45-degree angle to the board from all directions to cover the entire surface, do not over spay (there should not be any dripping of HumiSeal).
6. Allow the board to cure for a 24-hour period.

Note:

1. This procedure should be performed in a spay booth.
2. Gloves should be worn during the procedure.
3. This procedure should be performed on an ESD mat while wearing an ESD wrist strap.
4. Current should not be run through the board from the beginning of the procedure until it has fully cured.